SCIENCE.

FRIDAY, JULY 31, 1885.

COMMENT AND CRITICISM.

FROM A CIRCULAR signed by Elliott B. Page, F.T.S., general secretary for America, it seems that the American board of control of the Theosophical society held a session at Cincinnati on July 4, and, presumably among other business, passed a resolution to the effect "that the Theosophical society shall assume and exercise supervision of the American society for psychical research." This board of control thereupon 'authorized and required' one of their number, Professor Elliott Coues, the well-known ghost-smeller, "to act as censor of the said American society for psychical research, and to publicly review and criticise any and all of the proceedings, transactions, bulletins, or other printed matter which the said society may publish, at his judgment and discretion." The board further "expressly requires him, when any fact in psychic science shall have been satisfactorily established by the American society for psychical research, to explain such fact to the said [American] society according to the doctrines, and upon the principles of psychic science, of which the Theosophical society is the custodian in the United States."

The labor of sifting the evidence in regard to psychical phenomena is no mean one; and we feel sure that the managers of the American society for psychical research will feel deeply indebted that one so well posted in the phenomena of the occult world should have been appointed to the duty of aiding them, pointing out their errors when they may have gone astray, and informing them when they have made a discovery. To be sure, on account of our kindly feeling toward Professor Coues, we declined last winter to publish some of his statements in regard to ghosts which he had seen, felt, heard, and smelled, but which were afterward published by our less thoughtful contemporary, *The nation.* Possibly the members of the Theosophical society may have seen more ghosts than have been favored to our vision, and, considering themselves well posted, have felt justified and called upon to put forward Professor Coues as a public censor. Now, what body will come forward to 'assume and exercise' supervision of the American board of control of the Theosophical society?

ALTHOUGH THE CONFLICT over the evolution of man is practically ended so far as the general question in the opinion of scientific biologists is concerned, yet the special question through what series of forms man has been evolved is still unsettled. In regard to the descent not only of the vertebrates and the various classes of vertebrates, but also of the various orders of mammals, our knowledge has been rapidly extended, and we can now outline with some degree of accuracy the genealogical history of the higher animals. Of some forms we can give with remarkable precision the exact ancestry for some distance, but man is not one of these forms. The origin of a species may be ascertained either by direct observation or by inference: the former is the method of paleontology; the latter, of embryology and morphology. Since the paleontologist has as yet gathered no material to trace the immediate ancestry of man, we are obliged to trust to the indications of the embryologist, who finds in the foetal structures hints of ancestral organization, which, properly utilized, guide investigation to sure results. A most interesting step in advance is the discovery by Professor Fol, noted in another column, that the human embryo has four temporary caudal vertebrae, which must be interpreted as proof that man is derived from a long-tailed animal. Evidence is thus accumulating that the human

species is indeed related to the monkeys, possibly more closely than even to the anthropoid apes.

THE REPORT ON THE MUSEUMS of America and Canada, recently made by Mr. Ball of the Dublin museum to the Science and art department of England, is not a very satisfactory document. Apparently designed to furnish hints to similar museums in the United Kingdom, it is nevertheless chiefly occupied with descriptions of the scope of the different establishments and of the contents, and to some extent the general arrangements of the several museums. But the account of the last is generally unsatisfactory and imperfect, while very slight or no mention is made of such devices as are characteristically American, and in which museology has been notably advanced by us. The best applications of American ingenuity to questions of installation are unnoticed: such as, the methods by which cases are made air-tight, and are locked at several points by a single turn of the key; by which shelf-supports are made light, secure, and graceful, and variable at pleasure with slight labor; by which a case applied to one use can be converted in a few minutes to another very different one without interfering with its sightliness; — these and many other problems of museum economy are altogether overlooked. The unit system of the National museum and the systematic registry of the Smithsonian institution are praised but not explained; while the applications of museums to public educational uses by the special arrangement of their material is very inadequately treated. Although it is true that in this last point our museums have more to show in promise than in fulfilment, we have still not a little to teach Europe; while America, on its side, has much to learn from such collections, for example, as the Liverpool free museum.

LETTERS TO THE EDITOR.

Miocene deposits in Florida.

IN view of the discussion as to the extent of miocene deposits in Florida, it may be of interest to call attention to the discovery of the extremely characteristic Ecphora quadricostata by Dr. R. E. C. Stearns at Tampa. The matrix is a compacted fine greenish sand, crumbling under moderate pressure. The locality of the find is on the long rocky point. It is probable that there is a large area in Florida corresponding in age to what has been called miocene in Virginia and the Carolinas, and that it includes part of the phosphatic sandstones, as well as the mammalian and reptilian bone-deposits noted by Jeffries Wyman, Leidy, Neill, and others.

WM. H. DALL, *U.S. geol. survey.*

Washington, D.C., July 23.

Abert's squirrel.

I have read with interest the article in *Science* respecting the Sciurus Aberti, from Dr. Shufeldt.

Sciurus Aberti is not uncommon in northern Colorado. I have seen it as far north as the Câche à La Poudre River, about 40° 30′ north latitude, and up to eleven thousand six hundred feet altitude near Gray's Peak. In this part of Colorado (latitude 39° 45′ north), and along the South Platte River in the mountains south-west of Golden, I have seen this spring three different individuals, — two of them black; one gray and lighter beneath, with tips of its hair on its back and sides mottled with black. In fact, we see them here from gray to blackish gray, and entirely black, although but little differing in size, and all noticeable by long, tufted ears. It is more terrestrial than arboreal in its habits, and, from its extreme range, cannot be called or considered a southern species straggling northward. Having been in the San Francisco mountains, and in all northern Arizona, I have not seen any S. Aberti as deep black as those in northern Colorado.

I have mentioned its existence here up to eleven thousand six hundred feet altitude; but I should qualify this statement by saying, that a squirrel in every respect identical with the S. Aberti was seen by me several times at the Loneland Pass, west of Gray's Peak. But it was more than twice its size; indeed, larger than any other species of gray, black, or fox squirrel I have ever shot or seen. Its habitat was near timber-line, feeding on pine-cones, and generally returning to the enormous heaps of disintegrated rocks which seemed its usual abiding-place. I never succeeded in getting a specimen of this rare squirrel at that place.

E. L. BERTHOUD.

Golden, Col., July 2.

Color associations with the months.

A lady whom I had the pleasure of visiting to inform myself concerning some curious planchette-writing in which she had participated, has, she told me in answer to my inquiries, several interesting arbitrary associations of the class which was discovered by Mr. Francis Galton, and of which the number-form is the most familiar example. She had a curious number-form, — a form for the twenty-four hours, and another for the months. A sister had likewise various forms, but different from those of the first-mentioned lady. Both said that music always speaks. 'Why, yes! it speaks, *of course*,' they both remarked.

The one to whom I wish specially to refer associated colors with the months, and in a way which struck me as particularly curious, as it is a jumble of arbitrary and of obviously natural associations.

January, *February*, *and March* are bright yellow; upon a second question, 'shining white yellow.'

April is blue, 'the shade ladies call French blue.'

May, light yellow, 'not at all like January.'

June, bright green.

July is glaring yellow; and *August*, orange.

September is golden brown; *October*, dark brown.

November is 'indiscriminate gray. I cannot exactly describe it: it is like lead color.'

December is gray.

This case appears to me sufficiently different from any of those mentioned by Galton to deserve special notice.

It would be very desirable, I think, to make a systematic investigation of the influence of heredity on such associations of color and form. Could not the Psychical society undertake such work?

CHARLES S. MINOT.

Boston, July 22.

Maxwell's demons.

Sir William Thomson has shown that since work is readily converted into heat, while heat is never wholly transformed into work, or in fact into any other form of energy, there must continually take place what Tait calls a *degradation* of energy; while its *dissipation* is pronounced to be the inevitable consequence of certain laws, connecting heat and work, established by thermodynamics.

Maxwell has pointed out that one of these laws is by no means a necessary truth ['Theory of heat,' chapter xxii., Limitation of the second law of thermodynamics]. Theory shows, that, in what is called a state of uniform temperature, some of the molecules of a body have by chance much greater velocities than others. If, therefore, as Maxwell says, we could suppose the existence of small beings, capable of following the motion of each molecule, and opening or shutting holes in a partition so as to allow the fastest molecules to pass through one way and the slowest the other, it might be possible theoretically, without expending any work, to separate a gas into two portions, — one hot and the other cold, — in contradiction to the second law of thermodynamics.

It seemed to me of interest to point out that what, as Maxwell has shown, could be done by the agency of these imaginary beings, can be and often is actually accomplished by the aid of a sort of natural selection.

When the motion of a molecule in the surface of a body happens to exceed a certain limit, it may be thrown off completely from that surface, as in ordinary evaporation. Hence in the case of astronomical bodies, particularly masses of gas, the molecules of greatest velocity may gradually be separated from the remainder as effectually as by the operation of Maxwell's small beings.

It is true, that, in overcoming the attraction of the central mass, the escaping molecules may be deprived of the whole or a portion of their velocity; but the transformation of heat into work marks the process still more distinctly as an exception to the second law of thermodynamics, which "asserts," according to Maxwell, "that it is impossible to transform any part of the heat of a body into mechanical work, except by allowing heat to pass from that body into another at a lower temperature" ['Theory of heat,' chapter viii.].

One might now dismiss the subject as a mere curiosity; but is it not possible that what may be called the *renovation* of energy plays an important part in the history of the universe? While philosophers, anxious to preserve their store of available energy, may speculate on the possible equivalence of renovation and dissipation, will not the scientist hesitate, without further examination, to extend the principle of universal dissipation from physical to astronomical phenomena?

HAROLD WHITING.

The classification and paleontology of the U. S. tertiary deposits.

In penning my protest (*Science*, June 12) against some recent geological and paleontological speculations of Dr. Otto Meyer, I had intended that it should represent my final words in the matter, inasmuch as the article under discussion appeared to me unworthy of exhaustive criticism. The appearance of instalment No. 2 of the same series (which, if any thing, is only more remarkable than No. 1), and a rejoinder to the first from Prof. E. W. Hilgard, constrain me to add a few additional paragraphs, more, perhaps, of a general than of a special character.

Professor Hilgard says, "I emphatically agree with Heilprin as to the impossibility of subverting the cumulative stratigraphical evidence to the effect that the relative superposition of the several principal stages — the Burstone, Claiborne, Jackson, and Vicksburg groups — cannot be otherwise than as heretofore ascertained;" and, further, "I recall to my mind that years ago I had occasion to repel a similar attempt, on the part of Mr. Conrad, to subvert the relative position of the Jackson and Vicksburg groups upon supposed paleontological evidence." It might appear, from the conjunction of these expressions, that the only evidence supporting the accepted superposition of the different members of the southern old tertiaries was of a stratigraphical character, and that the paleontological evidence was in conflict with that derived from stratigraphy. As a matter of fact, however, the paleontological evidence, whatever it may have been when Conrad first devised his scheme of classification, is, as we now know it, absolutely comfirmatory of the pregnant facts which the stratigraphy of the region presents; and, indeed, it would be difficult to find a region of similar deposits where it is more so. The absence or scarcity of forms of a distinctively old-type facies in the Vicksburg beds, and the introduction there of new forms whose equivalents or immediate representatives are known only from the newer horizon, are sufficient in themselves to establish the position. While it may be true, although this is far from being proven, that not a single one of the Vicksburg fossils is identical with species belonging to the typical oligocene basin of Germany, it is equally true that several of the species find their analogues or equivalents in the deposits of San Domingo, which are indisputably of post-eocene age; and whatever Dr. Meyer's own individual opinion may be as to the bugbear Orbitoides, and to its value as a 'leitfossil,' the keen appreciation of Hautken, Rupert Jones, Karrer, Fuchs, Suess, and Duncan has long since settled the question. It is amusing to have the forty-year old opinions of D'Orbigny and Edward Forbes referred to as authority on the value or no-value of certain fossil forms whose organization was barely known at the time that the opinions were rendered, and whose differences from other (distantly) allied forms were not even dreamed of. With singular perversity of purpose, Dr. Meyer fails to inform his readers that the American foraminifer whose merits are discussed by Professor Forbes, is confounded by that naturalist with a form which belongs not only to a distinct genus and family from Orbitoides, but to a distinct sub-order.

Aside from the testimony of the Vicksburg fossils

themselves, however, the dominating faunal features of the intermediate Jacksonian ought to have carried conviction, or nearly that, to the mind of any unprejudiced paleontologist. The Zeuglodontidae, represented (as generally considered) by the two genera Zeuglodon and Squalodon, are thus far positively known (in their earliest forms) only from late eocene or miocene (and oligocene ?) deposits; and the only species of the former other than the American forms, and those obtained by Schweinfurth from Birket-el-Keroun (and recently referred by Dames to the eocene or oligocene horizon), is a member of the same group of deposits (the Bartonian) which in England correspond in position with the Jackson beds; i.e., overlie the Parisian (equal Claibornian). In that which relates to the oligocene (Orbitoide, Nummulite) rock of the peninsula of Florida, whose existence appears to give Dr. Meyer a considerable amount of anxiety, and which would better suit the requirements of the new theory were it cretaceous, our author need entertain no doubts: the rock is there, and has recently been found in several other localities which were not known at the time the mapping for my book was executed. No amount of chastising of Orbitoides will efface the testimony which it has unguardedly left behind.

I fully agree with Professor Hilgard as to the value of tracing derivative relationships between the species of the different formations, — a field of inquiry which I entered some years ago, but from which I have thus far drawn but barren fruit. In such inquiry it is necessary, however, to know the relative positions of the different deposits with which one is dealing, and not to proceed, as Dr. Meyer has done, from top to bottom, believing that top was bottom, and bottom top. Some curious evolutionary results might arise from this novel method of procedure.

For the rest, I need only reiterate my warning to geologists and paleontologists against the acceptance of the vagaries which are set forth in the two articles before us. Having given attentive study to the fossils from the region in question for a period extending over six years, and with the types of by far the greater number of species that have ever been described from the formation under my eyes and under my charge, I can say that those portions of Dr. Meyer's papers which relates to systematic paleontology are of about equal value with the geological, and clearly show that the author has not yet even found time to identify the numerous species which he is discussing. Pseudo-science of the kind to which we are here treated should be exposed. ANGELO HEILPRIN.

Academy of natural sciences, Philadelphia, July 20.

The etymology of 'ginkgo.'

Mr. Lester F. Ward, in a note to his paper on the ginkgo-tree (*Science*, v. 495, June 19, 1885), says, "The orthography of this word ['ginkgo'] is not settled. Linné wrote 'ginkgo,' as did also, apparently, Kaempfer before him ('Amoenitat. exotic.,' 1712), and as all botanists since have done, and do still; but nearly all lexicographers reverse the consonants, and write 'gingko.' . . . In the supplement to Webster's dictionary the word is said to signify 'silver fruit;' and it would seem that the etymology ought to determine the orthography."

The first use of the word *ginkgo* occurs in Kaempfer's 'Amoenitatés exoticae,' p. 811, where he says, "杏 銀 *Ginkgo*, vel *gín an*, vulgo *itsjò*. Arbor nucifera folio adiantino." And then he adds a page of detailed description, and a page of figures of the leaves and fruit. He gives the two Chinese characters that are still used for the fruit in Japan: they are pronounced by two different methods, according to two provincial pronunciations brought to Japan long ago, and corrupted there, — either *ginkĭyoo* (not the common English *oo*, but each *o* long, or as in 'oolite;' and the *g* as in 'give,' of course), or, much more commonly, *ginnan;* and they mean 'silver apricot,' or 'silver almond.'

It is plain that Kaempfer's *ginkgo* was a misprint for *ginkjoo;* since the second character (杏) is also given by him on p. 798 for the apricot, and transliterated *kjoo*, — a very reasonable way to write it, with the German sound of *j*, and the long *o* doubled, as actually pronounced. Undoubtedly, the last syllable of the word was written in the same way at p. 811; but, in printing, it became *kgo*, and the error has been sacredly perpetuated until the present time.

The word *ginnan* (the first *n* is doubled in pronunciation) is likewise misprinted, on p. 812, 'ginnaǔ.'

Instead of *ginkiyoo*, or *ginnan*, the name of the fruit, the tree is called in Japan *ichoo* (two long *o*'s, as before, not the English *oo*, but the *ch* as in English), and that is what Kaempfer writes *itsjò*.

Thunberg ('Flora japonica,' 1784, p. 358), probably guided by his own ear, in amendment of Kaempfer, writes the name *ginko*, which represents a third less common Japanese pronunciation of the second syllable, *koo*, with two long *o*'s; and he speaks of the great size of the tree, comparing the thickness of the trunk to oaks. Possibly the evident errors of the Linnean name in spelling, pronunciation, and meaning (signifying the fruit rather than the tree, though Dr. Williams's dictionary says the same name is in China given also to the tree; and it is in Japan, too, sometimes given to the fruit-bearing sex of it), may be considered strong arguments in favor of the name 'Salisburia;' or, perhaps better, in favor of Thunberg's reform of the orthography — if that be not treading on altogether too holy ground.

Kaempfer pointed out the resemblance of the leaf to Adiantum, not only on p. 811, but again in the detailed description on the next page.

My copy of Kaempfer has an old manuscript note, as follows, — "1753. See this plant in Mr. James Gordon's garden at Mile End, London," — showing that the tree was very early introduced in Europe.

The tree sometimes grows to a very large size, and there was one about five feet in diameter in my garden at Yedo, on high ground; but damp soil is said to be its preference. The juice of the thick pulp outside the nut is very astringent, and is used in making a somewhat waterproof, tough paper, and a preservative black wash for fences and buildings. The meat of the nut is cooked and eaten.

BENJ. SMITH LYMAN.

Northampton, Mass.

THE RECENT LAND-SLIDE IN THE WHITE MOUNTAINS.

BETWEEN Jefferson and the well-known Fabyan House, in the White Mountains of New Hampshire, is an oblong elevation of thirty-six hundred feet above the sea, known as Cherry Mountain. It is about seven miles in length

and three miles in width, the longer axis being north and south, and it rises from a nearly level area elevated fourteen hundred feet above the sea. On the east side, there is a close connection with Mount Deception, a spur from the principal White-Mountain range; and the Cherry-Mountain road, passing over the lowest point, reaches the altitude of twenty-two hundred feet. At the very north end of Cherry Mountain is an elevation known as 'Owl's Head,' about seventeen hundred and fifty feet above the plain. Down the steep side of this part of the mountain, at six A.M. of Friday, July 10, there rushed an immense mass of earth, rocks, and trees, producing a land-slide destined to be as memorable in the annals of White-Mountain history as the famous Willey slide of 1826. In less than five minutes this mass of earth slid down an inclined plane one and a half miles in length, a vertical descent of seventeen hundred feet, completely demolishing a partially built house, a large barn, injuring fatally one man, killing several cattle and smaller domestic animals, both those confined within enclosures and those feeding in the open field.

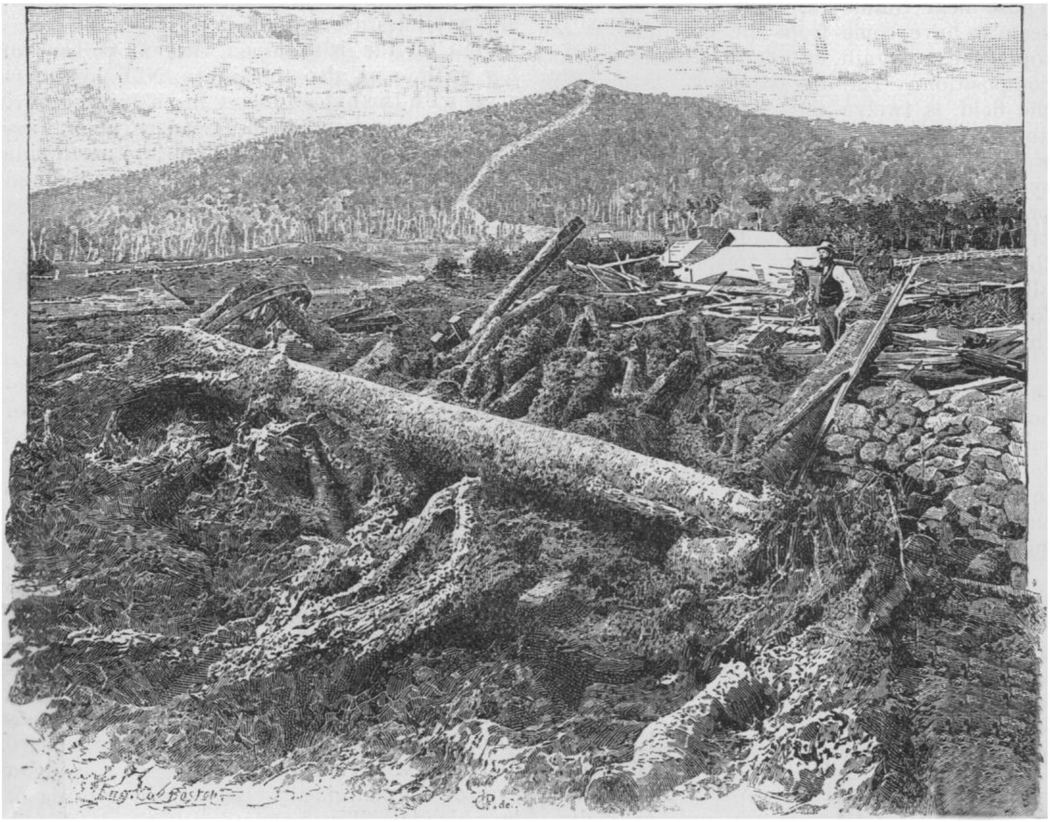
At the very base of the mountain is a carriage-road running east and west. Upon the south side, upon a slight eminence, stood Mr. Oscar Stanley's house, with a small orchard partly behind, and partly to the west. The stream which descended the valley of the slide flowed very near this house, ordinarily discharging as much water as would pass through a hoop of twelve inches diameter. A quarter of a mile nearer the mountain stands a small house occupied by John Boudreau. The *débris* nearly touched Boudreau's doorsteps, but had not force enough to remove Stanley's orchard. It spread over seventy-five feet width of grassland, while the principal portion passed on against the house. The greater elevation of the orchard seems to have insured its preservation.

Mr. Stanley, with two joiners, were at work in the house at the time of the slide. For half an hour previous there had been a heavy thunder-shower, but it was only raining gently when there came a noise sounding something like thunder. Stanley spoke to his companions, who suggested the noise came from a train on the railway. He ran to the door, saw the slide coming, and cried out, "I am going to get out of this: the mountain is coming down!" They all jumped for their lives, and barely escaped. The hired man, Walker, who was milking in the barn, was less fortunate. He heard the noise, ran from the barn, but was caught by the flying timbers and badly bruised, so that he died a few days later. He was buried on the 16th, upon the anniversary of his birth, and also the day set for his marriage with the oldest daughter of Mrs. Stanley.

The arable land of Mr. Stanley, amounting to about twenty acres, lay upon the north side of the road, and it is entirely covered by mud and stones. Grass, oats, wheat, potatoes, and the garden were all buried under several feet thickness of 'calamity,' as he described it. Several observers from a distance heard the noise, and saw the mass slide down the mountain. It would seem that rain had fallen copiously during the whole of the night previous, completely saturating the natural earth or decomposed granite gravel of the mountain-side. Just before six A.M., another thunder-cloud moved against that which had been discharging during the night, so that the slide seems to have been nearly synchronous with the collision of the clouds. This shock would naturally produce what is commonly called a 'cloudburst,' when an extraordinary amount of water falls. This, meeting *débris* already saturated, produced the conditions favorable for the descent of the mass, especially should any accidental cause furnish a starting-point. Such a cause existed in this case, which will be mentioned presently.

The rock at the summit is peculiar, being a syenite characterized by very small crystals of hornblende. Two hundred feet down, this is replaced by a greenish porphyry, verging into a granite called the 'Albany granite' in the 'New-Hampshire geological report.' This porphyry is not very thick. Below it is found the rock making up the principal bulk of Cherry Mountain, a species of protogene or chloritic granite. All these rocks are traversed by jointed planes, dividing the granites into parallel plates two, four, or more inches thick, and all dipping northerly, or down the steep slope at an angle of about 20°.

This slide started less than forty feet below the summit of Owl's Head, from a precipice of perhaps ten feet altitude. The site is further designated by a vacant place in the precipice, from which large blocks were detached, presumably the beginning of the catastrophe. For a hundred and eighty feet vertical descent, the slope may be 20°, and the direction of the movement N. 60° E. for about half a mile. Then follows a sort of shelf, or step, where the inclination suddenly increases, becoming perhaps 30° to 35° for a short half-mile in distance, and a fall of six hundred and fifty feet.



THE RECENT LAND-SLIDE ON OWL'S HEAD.[1]

The path of the slide, commencing at a single point, gradually increases in width till the maximum of a hundred and seventy-five feet is reached in a vertical descent of three hundred feet. Essentially this width is maintained for a vertical descent of six hundred and fifty feet, when there is a change in the direction on its reaching the bed of the stream, and the width is narrowed as much as thirty or forty feet. Very many smooth ledges were uncovered in the first five hundred (vertical) feet from the starting-point, and the angle of the slope has lessened to about 20° at three hundred feet from the top to the bend six hundred and fifty feet below the starting-point. This part of the slide may be seen to excellent advantage from the village of Jefferson Hill, and other elevated points in the neighborhood. The lower part of the slide is obscured from most points by the adjacent forest.

[1] The illustration of the slide is from a photograph by D. W. Butterfield, photographer of the Boston and Lowell railroad.

Coincident with the change in the direction from N. 60° E. to nearly north is a diminution in the slope and a deepening of the excavation. At first not more than a foot or yard in depth seems to have been removed. At the bend the depth of the middle portion of the excavation is as much as forty feet. The distance from the bend to the extreme end of the slide is about one mile. The slope falls from 20° to about three hundred feet to the mile below Stanley's house. The width of this lower section is usually about a hundred and fifty feet, being ninety-five feet at the narrowest place below Boudreau's house, and a hundred and seventy-five feet just above Stanley's. So rapid was the descent, that every change in the direction, caused by bendings of the cañon, carried the *débris* much higher upon the bank in front. There is a marked absence of large blocks of stone above Boudreau's. Near his house a rather large bowlder was stranded. Others appear just

above Stanley's and in the field below. Those near Stanley's, perhaps six feet long, seem to have come from the precipice at the top of the mountain, as identified by the mineral composition. The largest block examined in the field is twelve feet long, six feet wide, and five feet high, and is of porphyry. Others were not examined, but these suggest that the syenite fragments started from the summit precipice. These struck the projecting ledges of porphyry three hundred feet lower down at the commencement of the steeper slope, when all of them combined furnished the accidental force which urged the moistened *débris* down the mountain-side with such fearful velocity.

The *débris* is thoroughly mixed with vegetable loam, and the black soil of the forest; so that, though covered by a yard thickness of mud, the field may again become productive to tillage. This mud disported itself very much like lava flowing down inclined slopes, the terminations being escalloped, and the surface waved by small ridges like ropy lava.

Briefly, then, the conditions giving rise to this slide upon Cherry Mountain seem to have been the presence of gravelly granitic *débris* upon smooth ledges having a jointed structure pointing downwards. This *débris*, thoroughly saturated by water, became plastic and moved downwards just as soon as the blocks of syenite and porphyry started on their course, breaking off trees, and thus increasing the moving mass every rod of the way, till the lessened slope caused the viscous flood to stop. Such has been the history, probably, of all the more notable slides in the White Mountains.

The locality may be reached most conveniently by way of the Whitefield and Jefferson railroad. All trains will stop at the ' slide station ' if desired. This is a point only seventy-five rods distant from the base of the slide.

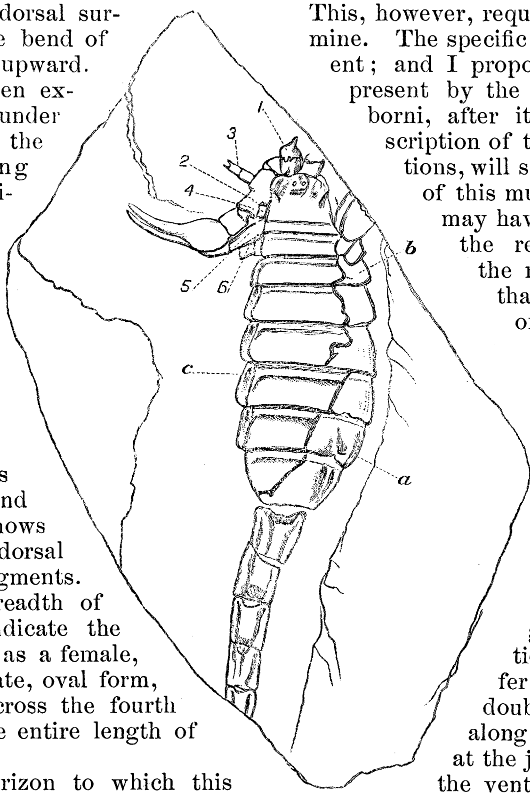
C. H. HITCHCOCK.

AN AMERICAN SILURIAN SCORPION.

ON Nov. 12, 1884, the announcement that a fossil scorpion had been found in Silurian rocks in Sweden was made to the Swedish academy of sciences, and the printed notice of it published in the *Comptes rendus* of the French academy, Dec. 1. On Dec. 18, Dr. Hunter of Scotland, in making the announcement of the Swedish discovery to the Edinburgh geological society, stated that he also had found a Silurian scorpion during the summer of 1883 in Scotland; and I can now add the statement that a fossil scorpion has been found in the Silurian rocks of America, and at an earlier period than either the Swedish or Scottish specimen, as it was obtained by the discoverer on Nov. 10, 1882.

On June 8 of this year, Mr. A. O. Osborne of Waterville, Oneida county, N.Y., wrote me that he had that day sent me a small box of fossils which he wished me to name for him, mentioning a few of them as of " special interest, as they are the first of the kind that I have found." On opening the box, some two weeks after it arrived, I found among those of ' special interest ' a nearly entire scorpion which measures a little more than one and a half inches in length, but wanting a part of the fifth, and all of the sixth, segment of the tail. The specimen is preserved on the surface of hard hydraulic limestone, and presents the dorsal side to view. It is extremely thin and compressed, and, as a part of the substance is removed along the right-hand side of the abdomen and over the entire portion of the tail shown, these parts expose the inside of the ventral surface. The specimen shows the Cephalothorax and the left mandible (1) in place; the left palpus entire, with its chelate process (2); the first walking limb on the left side (3), with an apparently *bifid* extremity; and parts of each of the other three limbs on the same side. On the right side the palpus is folded on itself, and is imperfect. On the Cephalothorax the eye-tubercle is distinctly visible, and the points indicating the ocelli are readily distinguished; the ridges marking the position of the lateral eyes are visible, but the ocelli cannot be distinguished. As the inside of the abdominal plates is seen for about one-third of their width along the right side of the specimen, the spiracles ought to be shown, if they ever existed. Points which may have been spiracles are faintly visible; but the actual openings must have been very obscure, if present at all. The crust of the specimen is smooth, and destitute of the elaborately granulose ornamentation which characterizes the Swedish specimen: consequently the obscurer features would be more easily detected. But the specimen being so extremely flattened and small, renders other features more difficult of recognition. There is one feature shown in which this species differs very materially from living forms of the group. The limbs are crowded forward. The coxa and second joint (trochanter) of the posterior limb appear from beneath the edge of the first dorsal segment, on the left side; the end of the second ventral segment (*b*) is equal in extent to the end of the second dorsal segment, and of the same length antero-posteriorly. In the

recent scorpions this segment is not visible in any position (at least, not in any which I have examined), there being only five ventral plates of the abdomen; while here there are six in sight, which are almost exactly coincident with the dorsals in position. Another feature, I feel, ought to be noticed here. In recent scorpions the tail-segments seem as if reversed in position; that is, when straightened out on a plane with the abdomen, what would appear as the dorsal surface is below, and the bend of the articulations is upward. In this one it has been exactly the reverse; the under surface, as shown on the specimen, presenting only the two longitudinal ridges, and showing also the sinus at the posterior part of the segments occupied by the chitinous portion of the joint. The Swedish specimen would also appear to present this feature, as the upper surface, as figured on Thorell and Lindström's plate, shows the four ridges of the dorsal side of the tail-segments. The proportionate breadth of the body would indicate the American individual as a female, as it is of an elongate, oval form, being half as wide across the fourth dorsal segment as the entire length of the abdomen.



The geological horizon to which this American specimen belongs is that of the water-lime group, at the extreme base of, or perhaps more properly below, the lower Helderberg group (equivalent to the Onondaga salt group of central and western New York), and is nearly the same as that from which the Swedish specimen was obtained, probably somewhat lower. The associated fossils are Eurypterus remipes DeKay, Dolichopterus macrocheirus Hall (only lately obtained from this locality), Pterygotus Osborni Hall, and Leperditia alta Conrad. In other parts of the state, other forms of Eurypleri are found; also Ceratiocaris, with a very few molluscan forms, — all indicating a marine deposit. The fossils associated with the Swedish specimen are closely similar to the above in part. But many of the brachiopods mentioned as occurring there are allied to forms occurring in beds below, while others would indicate a horizon of lower Helderberg age; so that we may infer that the two forms belong very nearly in the same position geologically.

The zoölogical affinities of the American scorpion very closely resemble those of the Swedish specimen; and it may, perhaps, be classed under the same genus, Palaeophonus. This, however, requires further study to determine. The specific relations are quite different; and I propose to designate it for the present by the name Palaeophonus Osborni, after its discoverer. A full description of the specimen, with illustrations, will shortly be given in a bulletin of this museum. It is possible this may have been a land-animal, like the recent scorpions, certainly the natural inference would be that it was; and the finding of an undoubted stigmata in one of the ventral plates of the Swedish specimen would certainly lend strength to the supposition. But on this American specimen, where one end of each of the ventral plates is exposed to view, the stigmata certainly ought to appear; but it would require so great a stretch of imagination to see them, that I prefer to leave them as extremely doubtful. There are, however, along the left side of the body, at the junction of the dorsal with the ventral plates, in what should be the flexible chitinous membrane of the four stigmatic segments, what might very readily be interpreted as stigmatic openings (c); but these are so anomalous in their position that I have as yet felt uncertain of their nature, and also of the terrestrial character of the animal.

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AN EVENING IN CAMP AMONG THE OMAHAS.

We had just finished our supper in the long conical shadow of the tent; and, the dishes being disposed of, we settled ourselves for the

evening chat. While Ma-wa-da-ne was filling his pipe, the other four men disposed themselves comfortably preparatory to the enjoyment of the smoke. Te-me-ha, with her usual industry, had spread upon her lap the brilliant-colored porcupine-quills with which she was embroidering a pair of moccasons, while old Me-pe sat rocking to and fro, and dividing her attentions between the gay-colored quills and the fringe of my wrap. After the ceremonial round of the pipe, I said to the men, —

"You do your share in this embroidery, since you capture the porcupine. Tell me about hunting them."

After a few moments of silence, a smile that broadened into a quiet laugh stole over Ma-wa-da-ne's face; then tightening his blanket about his bent knees, and giving a little shake of the shoulders to settle himself, he began, —

"The porcupine is a great digger, and makes a hole large enough for a man to crawl in. He likes best to live on the brow of a sandy hill, where there are no hollow trees. We hunt them with a long crotched stick. This we thrust into the hole until it strikes the animal; then we twist it to snarl it in the quills and fur. When we think the stick is well caught, we begin to pull gently to draw the animal out. Sometimes the stick loosens, and only the fur comes; then we have to try again, and get a better hold. When the animal is successfully brought to the opening, we look for his head, and give it a sharp, hard stroke with a stick which we carry for the purpose, and so kill him. We then have to skin him, and the women take what they want of the quills."

The smile had faded during this practical talk, but it returned as Ma-wa-da-ne resumed, —

"There were two Poncas who married sisters. The wives were fond of embroidery, and used so many porcupine-quills that it was hard to keep them supplied. One day they were at work, when they discovered they would very soon be out of quills, and each wife began to tease her husband to go hunting for porcupine. The young men were newly married, and wanted to please their wives: so, after enjoying the teasing a while, the men started, each going his own way toward the sand-hills. As one of them sped along, he noted near the top of a hill the large hole of a porcupine. As he approached the opening, he saw that the hole ran through to the opposite side of the hill. He thrust in his stick to search for the lateral burrows, hoping to find the animal. Creeping into the opening himself, while he was thus engaged, the entrance from the opposite side of the hill slowly darkened, and he discerned, to his consternation, the figure of a man. Not knowing whether this apparition might be friend or foe, he concluded to keep perfectly still. While thus watching, he felt a stick gently strike his breast; then, with more force, it began to be twisted. He seized it in his hands, holding it firmly, when the holder of the stick began to pull. The man in the hole allowed his arms to be stretched forward a little, and then dropped the stick. By repeating this operation, the outside hunter's enthusiasm was aroused, and he exclaimed, 'He must be a big fellow!'

"The man in the hole recognized the voice of his brother-in-law, and fear gave place to the desire to play a trick. After baffling the hunter for a while longer, the man crept slowly toward the opening, keeping tight hold of the stick as he advanced, while the hunter kept twisting to make sure of his game. The entrance reached, the make-believe porcupine plunged suddenly forth, exclaiming, 'What do you want?'

"The terror-stricken hunter dropped his stick, his excitement being too great to recognize his relative, and ran crying, 'Grandfather, have mercy on me!' A shout of laughter from the 'grandfather' made the hunter turn, and he, too, joined in the laugh."

When the merriment over the story had subsided, Sin-da-ha-ha remarked, —

"We catch rabbits and raccoons and skunks in the same way. The skunk hears the hunter advancing; and the animal will sometimes come near the entrance of his hole, and pound with his feet, making quite a loud noise, hoping to scare us. When we have thrust in our stick, and twisted it well in the tail, we draw the skunk near the entrance; then we put our arm in the hole, and grasp him tightly around the hind-quarters, pressing the tail firmly against the body; we then draw him out, striking the head quickly to prevent the animal biting. Sometimes we find eight or ten skunks in a single hole, each one of whom will try his charm of drumming on us. Young men like to wear gaiters made of the skunk-skin," turning, as he said this, to the youngest member of the party, to whom I said, —

"You tell me a story now."

In a few moments the young man began, —

"When I was young [here the old men shouted, but the young man with a merry twinkle in his eye went on], "I was very observing. One day I was looking about me, near the slough back of father's, when I noticed a frog hopping very fast. Suddenly he stopped, and picked up a stick three or four inches long,

and turned, holding it firmly in his mouth. I saw he was being closely chased by a water-snake who tried to swallow the frog, but the stick in the frog's mouth caught in the jaws of the snake. Several times the snake withdrew, and tried to attack the frog from the rear; but he would jump around, and immediately face the snake again. This happened several times; and at last the snake got tired, and slipped off in the bushes, leaving the frog victorious."

"Pretty good," said Wa-ja-pa. "I'll tell you something. Once late in the fall, Badger and I went hunting along the Loup River. We were afoot. We started up several elk, ran them down, and killed one. While I was butchering, Badger returned to camp for a pony to bring in the meat. After I had skinned the animal, and piled the cuts of meat on the skin, I lay down near by in the tall grass, and fell asleep. I was awakened by the sound of footsteps. Rising cautiously, I saw a large gray wolf standing near the meat. When he espied me, he began to growl, showed his teeth, and all the hair on his back stood up. Taking my gun, I levelled it at him, and shot. He was a fine fellow, and, as he fell, I determined to have his skin at once. It was the work of a few moments to flay him. As I threw his skin to one side, the legs of the wolf began to twitch, and the blood to trickle. In a moment the wolf was on his feet, and walking off without his skin.

"I never have believed in dreams, or the wonderful animals they tell about; but, when I saw that wolf walking away, I felt uncomfortable, but I made up my mind to shoot again. I did so, and he fell, and walked no more."

"When I got there with the pony," put in Badger, "I saw the place where the wolf was skinned, and tracked his steps by his blood to where he lay dead from the second shot."

"I remember hearing," said the young man, "Ou-zu-ga-hae and his brother tell that once, when they were flaying a buffalo-bull they had just shot." Then, turning to me, he said, "You remember, we first cut the skin of a bull down the centre of the back, and take off one-half at a time. Well, when the men had one-half the hide off, up got the buffalo-bull, shaking his head and staggering forward. The frightened brothers ran away as fast as their legs could carry them. The bull went but a little distance, fell, and died. It was some time, however, before the brothers could make up their mind to go back and skin the other side of that animal."

Old Me-pe gave a twitch at my wrap, and said, —

"Can't you tell a story?"

"Yes," I replied, "I will tell you about a black hen I once had. A friend sent me a present of a pair of guinea-fowl. By and by the guinea-hen began to lay; and, as I wanted to be sure to raise some fowl, I put ten of her eggs under a little black hen. She sat patiently for three weeks (the time it takes chickens to hatch), but she had to wait another week for the guinea-chicks. When they came out, — little sleek brown things with yellow legs, — the hen was very happy. But she was soon a troubled hen; for, when she clucked and bustled and scratched for them, they all darted away and hid. In her astonishment, as she stood silently looking for them, they would gradually creep back. Then she would cluck and scratch again, desiring to give them something good to eat; but away would dart the chicks, leaving the hen alone. After several such experiences, the hen evidently thought it was the clucking that scared them: so, as she walked along with her brood, she would scratch, but make no sound. Still, every time she scratched, the chicks shot off and hid. Then she thought a second time, and determined to cluck and call them, but not to scratch. This suited the little guineas, and ever after that the black hen and her ten guineas walked among my flowers and vegetable-garden, doing no damage."

"I have heard white men say hens have no sense," said Wa-ja-pa; "but your hen knew something. Of all the animals, I like the beaver best. He is most like a man. He plans and works and builds."

"You wanted to see an artichoke: there is one," said the young man, tossing the little brown root into my lap. "Yesterday evening I found a field-mouse's nest, and he had stored many artichokes. I went back to-day to get you some; but the mouse had been busy all night, transferring his stores to a secret place. Although I tracked him, it was too bad to rob the little fellow: so I only took one for you." I dropped the root into my purse, where it lies to the present day. A. C. FLETCHER.

THE MEXICAN AXOLOTL, AND ITS SUSCEPTIBILITY TO TRANSFORMATIONS.[1]

THE prolonged researches of Miss Marie von Chauvin on the biological relations of the amphibians have led to most interesting results concerning the transformability of the Mexican axolotl. The observations published by this lady ten years ago proved that under certain conditions, and by certain treat-

[1] From the *Journal of science*, June, 1885.

ment, it is possible to convert the aquatic axolotl, breathing by means of gills, into the terrestrial Amblystoma, which breathes by means of lungs. Individual differences, however, came to light which demanded further inquiry. This has accordingly been carried out, and Miss von Chauvin now lays her conclusions before the public in the *Zeitschrift für wissenschaftliche zoologie.*

It was soon found that younger specimens could be more easily transformed than older ones; but even among individuals of the same age great differences came to light, depending upon the manner of treatment. Thus axolotls can be more readily converted into Amblystomas, if they are kept in water containing little air, and are thus compelled to come more frequently to the surface, and to breathe with their lungs. Others, kept in richly aerated water, obtained a sufficiency of air through their gills, and were, in consequence, less readily converted. It appeared, further, that it is merely requisite to apply any external compulsion towards transformation up to a certain grade of development, and that, when this has been reached, the animals arrive at the higher form without any further interference.

The point of time when the axolotl has arrived so far in its metamorphosis as to have totally lost the power of living in water does not coincide with the absorption of the gills. On the contrary, the most recent observations prove that the power of the axolotl to live in water may, under certain circumstances, be retained for a long time in individuals which have become completely adapted to a terrestrial life, and only disappears after the first moulting. Various experiments with axolotls which had passed through this stage proved indubitably that a return to their former life had become impossible: they completed their metamorphosis, even though all possible means were taken for its prevention. On the other hand, axolotls which had lived for months in damp moss, and had breathed with their lungs but had not changed their skins, felt completely at home as soon as they were returned to the water.

This surprising fact induced Miss von Chauvin to institute further experiments on the adaptive power of the axolotl, and in particular to attempt by suitable treatment a repeated transformation of these creatures from the lower to the higher stage, and thence back again to the lower. This interesting experiment has, in fact, been carried out with a successful result.

Without entering upon an account of the means and the precautions used, or a description of the various stages of transformation, we pass at once to the results.

An axolotl lived altogether for three years and a half. The first fifteen months it spent naturally, and without any interference, in the water; its development was then artificially accelerated, and in twelve days it was transformed into a lung-breathing animal; it then lived on the land for fifteen and a half months; it was next, during the lapse of six days, brought back to the water, where it spent three and a half months; in the space of eleven days it was again so modified that it could once more live on the land, where it remained for rather more than six months, up to its death.

The power of adaptation to a change of medium was so distinctly marked in this animal, and was maintained for such a length of time, that Miss von Chauvin instituted a further experiment with axolotls, with the object of interrupting at pleasure the metamorphosis of these creatures, and suspending it for years, and subsequently testing their adaptability. For this purpose, served five axolotls, each about six and a half months old, in which the development of the lungs was easily so far accelerated that they could live on the land. At this stage the further metamorphosis was suspended by a low temperature, and by being placed during the night in water. Nevertheless, in one specimen there occurred quite unexpectedly, after the lapse of fourteen months and twenty-two days, the first moulting, followed by the further conversion into the Amblystoma form. The four others were kept, however, for three years and two months in the state of suspended metamorphosis. After the expiration of this time, the attempt was made to convert two of them back into axolotls, while two others were to pass on fully into the Amblystoma stage. The result of this experiment was affirmative. The first two specimens reverted to axolotls: of the latter two, one died, while the other became a perfect Amblystoma.

The three experimental subjects, whose metamorphosis was arrested on Nov. 8, 1879, were in good health in October, 1884, in spite of the most arbitrary interference with their natural course of development. The Amblystoma was indeed smaller than those which had been transformed previously; but it was nevertheless very active and greedy, and quite conveyed the impression of a healthy, well-developed animal. In the two axolotls also, the arrest of the metamorphosis remained without injurious consequences. They are well developed, and feel quite at home in their element. They can be distinguished from normal axolotls merely by a somewhat smaller size, and by a less luxuriant development of the external gills.

The results of these experiments show how exceedingly great is the influence of the surrounding medium upon the organism of animals. Of the most important agents, air, water, and heat, the last possesses indubitably the greatest power over the nature of the animal; and next after it comes the character of the medium in which the animal is compelled to live. The external conditions of life can transform the nature of an animal either by a sudden metamorphosis or by protracted action; but, in opposition to all these external agencies, there stands a powerful influence seated within the animal, and acquired by inheritance, which can, indeed, be modified to a certain degree, but never entirely suppressed. This circumstance explains both the many individual fluctuations in the result upon perfectly identical treatment, and the want of success of so many experiments.

Miss von Chauvin points out that the cases of

'neotenism' (persistence of embryonal forms) recently observed among the Urodela find at least a partial explanation in the artificial transformation of the axolotl as here described: for it has been shown that the tendency to continued development can be suppressed by suitable influences; and such influences may make their appearance naturally, and involve a persistence of the larval condition.

The importance of this series of investigations on the primitive transit of the vertebrates from the water to the land has been already pointed out. It must not be forgotten that the remarkable tenacity of life of the amphibians is a capital element, both in such natural transit and in the successful result of the experiments described. With insects the case is very different: their metamorphosis has in certain cases been suspended, both naturally and experimentally; but all attempts which we have made to induce the reversion of an insect to a larval condition have so far miscarried.

HAS MAN A TAIL?

HAS man a tail? It is a question under dispute. Anatomists have failed to agree as to what constitutes a true tail. A tail is generally understood to be a distinct posterior prolongation of the body, containing a greater or less number of vertebrae. This at once excludes all the cases of a caudal appendix of a fleshy character, such as are found among the rarer abnormalities of human structure. Where does the tail end in front? The comparative anatomist is obliged to designate all the vertebrae behind the sacrum as caudal; so that we are led to the conclusion that the four or five vertebrae of the human coccyx constitute a true though not a protuberant tail. In the embryo, however, during the second month of gestation, the coccyx does form a distinct conical projection, which properly answers to all the requirements of a true tail; so that there can be no question that man has a genuine though rudimentary tail, — a survival from his simian ancestors.

But as man is descended from long-tailed animals, we ought to find evidence in the human embryo of additional vertebrae. Professor Hermann Fol of Geneva has shown (*Comptes rendus*, 1885) that this is the case. He has found, that, besides the thirty-three or thirty-four vertebrae which persist into adult life, there are other temporary ones. In an embryo five and six-tenths millimetres (about twenty-five days), Fol found only thirty-two vertebrae: Prof. W. His had found thirty-three vertebrae in an embryo a little larger, — seven millimetres. This led Fol to suspect that there might be a still further increase, although in the adult there are only thirty-three or thirty-four vertebrae. He examined two embryos of eight or nine millimetres. One of them was divided into a series of three hundred and twenty sections, and every section was drawn with a camera lucida. Upon counting up the series, it was found that there were thirty-eight vertebrae. Comparison with other embryos satisfied Fol that this condition was perfectly normal. With the exception of the last two, all the caudal vertebrae had a blastema like their anterior fellows. The last two segments were indicated only by the perfectly distinct muscular segments (myotomes). The extremity of the tail was formed solely by the medullary tube, covered only by the skin. The notochord extended almost to the end. The terminal vertebrae have only an ephemeral existence. In embryos of twelve millimetres (six weeks) the thirty-sixth to thirty-eighth vertebrae have fused into a single mass. In embryos of nineteen millimetres the last five vertebrae have apparently fused to make the permanent thirty-fourth. C. S. M.

ETHNOGRAPHY OF ANTARCTIC AMERICA.

No inhabited land is found within the antarctic circle; and the title which the learned 'secretary-general of the ethnographic institution' of France has given to his memoir may therefore seem not strictly warranted. But, in the more general sense in which 'arctic' is applied to climate as synonymous with 'wintry,' the epithet 'antarctic' is sufficiently appropriate to the only region of the southern hemisphere in which the climate is severe enough to exert a controlling effect on the habits and character of the people.

Two years ago a little group of Fuegians, comprising four men, four women, and three children, were brought to Paris, and placed, as so many anthropological exotics, in the 'Garden of acclimation.' There they remained for several weeks, and were visited, of course, by many men of science. M. de Lucy-Fossarieu had already made a study of the tribes and languages of California, and naturally did not neglect the opportunity of examining the natives of this more peculiar and less known region. He saw them frequently, and gained much novel information, which considerably modified the opinions previously entertained respecting this people. He was led to examine the works of earlier observers from the time of Magellan to our own, and to gather from their descriptions, combined with his own observations, a view as complete as can now be attained of the ethnology of the southern extremity of our continent. Such, it appears, was the origin of this memoir, for which students of science are under great obligations to the author. It displays in a marked degree the qualities of clearness of statement, and accuracy of deduction, which distinguish the works of the best French investigators. A summary of its contents, with some additions derived from personal observation of the country and the people, will serve to show the importance of the conclusions which the latest evidence tends to establish.

The Rio Negro, a navigable stream of considerable length, divides Patagonia proper from the territories of the Argentine Republic. From this river to the

Ethnographie de l'Amérique antarctique: Patagons, Araucaniens, Fuégiens. Par P. DE LUCY-FOSSARIEU. Paris, 1884. 4°.

Straits of Magellan, the country is inhabited by two distinct races, — the Tehuiliches, or true Patagonians, who roam over the vast and arid plains and uplands stretching east of the Andes to the Atlantic; and the Araucanians, who possess the strip of broken and rugged coast-land lying between that mountain chain and the Pacific. The languages of the two races belong to the polysynthetic or incorporative class, but otherwise differ totally, both in grammar and in vocabulary. A like general resemblance, with an equally marked differentiation in special traits, is noted in their other characteristics, physical and moral. The Araucanians, or 'Chileno' Indians, are well known, and have often been described. They are a people of medium stature, well formed, and bearing in their features and color, as well as in their character and habits, the typical characteristics of American Indians. Their energy and unconquerable valor have made them famous; nor only so, but, infused into their half-breed kindred, the Chilian people, these qualities seem destined to secure to that nation the headship of the South-American republics.

The Tehuiliches belong to what D'Orbigny has termed the Pampean race. Their congeners, along with some wandering tribes of Araucanian origin, are spread over the immense treeless plains of the Argentine Confederacy. From them the Tehuiliches, or proper Patagonians, differ mainly in the peculiar traits, bodily and mental, which they owe to the nature of the country they inhabit. This is, for the most part, little better than a stony desert, in which a tree is seldom seen, and only a scanty herbage here and there struggles into existence through the shingle which covers the surface of the land. Some lakes are found, mostly brackish; and a few rivers, fed by the snows of the Andes, traverse the country, and empty into the Atlantic. This monotonous and forbidding region, an antarctic Sahara larger than France, has a population of nomads whose number is supposed not to exceed ten thousand souls. Each individual has therefore a space of more than twenty square miles from which to derive his subsistence. Their food is altogether animal. Guanacoes and ostriches wander over the boundless plains. The Indians, on their fleet horses, run them down, and then capture them readily with their favorite weapon, the well-known *bolas*. Two balls of stone, or hardened earth, enclosed in leather, held together by a thong, are whirled around the head of the pursuing horseman, and then launched with such force and accuracy as to strike down an animal at the distance of fifty yards. Horse-flesh also, in recent times, enters largely into the Patagonian diet. Like the Eskimo and other tribes of the far north, these natives are fond of fatty substances, which they frequently devour raw. Their strong food, of which there is rarely any lack, and their habits of constant movement in the open air, under a climate severe but not inclement, give them large and robust bodies. The tales of their gigantic stature, so often told and as frequently denied, are thoroughly investigated in this memoir, and with a result which will be interesting to anthropologists.

Careful measurements have been made in recent times, by different observers, of many individuals in various parts of Patagonia. The result is that the mean stature of adults (of both sexes, it would appear) is found to be about 1.78 metres, or five feet ten inches English. "This mean," remarks the author, "may seem rather low; but if we compare it with that of France, which is only 1.65 metres (about five feet five inches), and if we consider that for all humankind the statistics give only 1.70 metres (rather less than five feet seven inches), we shall perceive that this figure represents in reality a very lofty stature, and makes the Patagonians the tallest race of men now existing." Men of six feet French (six feet three and a half inches English) are common among them; and occasionally one is found who reaches two metres, or six feet six and a half inches.

This, however, is not all. The Patagonian, in the upper part of his body, is of a huge build. His trunk and head are large, his chest broad, his arms long and muscular. On horseback, he seems far above the ordinary size of man. When he dismounts, however, it is seen that his legs are disproportionately short and slender: they frequently bend outward. His walk is heavy and lumbering. These are the well-known peculiarities which are found in the Tartars, and in all races of men who spend most of their time, like the Patagonians, on horseback. But it is only a little over two centuries since the horse was introduced into this region. The natives who were first seen chased the swift guanaco and ostrich over their immense plains on foot. Such activity required long, straight, and muscular legs. It is not too much to suppose that the total change in their habits of life, which has occurred since they became a nation of horsemen, has detracted at least two inches from their stature. Adding these lost inches to their present height, we recover the giants who astonished the companions of Magellan, and vindicate the narratives which later writers have discredited. We gain also a notable evidence of the influence of natural causes in modifying the physical characteristics of men.

The moral qualities of the Patagonians, as depicted by the author, are equally in harmony with their surroundings. Their tribes, scanty in numbers and widely scattered, rarely come into collision: wars are consequently infrequent. The more violent passions are seldom aroused. They are neither vindictive nor cruel. Their women are well treated. Like the men, they are good riders, and are, like them, tall, strong, and brave. If need be, they take part in fight beside their husbands and brothers. Children are the objects of singular tenderness. A whole tribe has been known to shift its location merely to satisfy the caprice of a child. The severe trials of their endurance to which youths, on arriving at maturity, are subjected among the fighting tribes of the north, are unknown among these peaceful nomads of the far south. It is hardly necessary to say that slavery does not exist among them, and human sacrifices are unheard of. Horses, in modern times, are frequently killed over the graves of their dead masters, and are sometimes offered in sacrifice to their divinities;

but the more usual offerings are the clothing and other wares which form their simple household wealth. These are usually hung upon trees, which, perhaps from their rarity, are deemed to have a sacred character.

Leaving these gentle giants, we cross the Straits of Magellan, and encounter what seems at first view to be a very different people. Voyagers who have touched at Tierra del Fuego have been accustomed to represent the natives as a hideous race, dwarfish and repulsive in appearance, and degraded in mind and morals almost to the level of beasts. This representation, in our author's view, is not a just one. Accurate measurements show that the average stature of the Fuegians somewhat exceeds five feet five inches English; which, the author remarks, actually surpasses a little that of the Araucanians. This average, of course, includes both sexes. Their squat appearance is due to their mode of sitting, in their canoes and their small dwellings, with their legs doubled under them. The limbs, retained long in this compressed position, become thin and bent. Otherwise the men are well formed, with broad chests and strong arms, and their features are not particularly unsightly. A large face, rather round than oval; prominent cheek-bones; a forehead wide and low; projecting brows; eyes small, black, bright, and restless; a short but nearly straight nose; a wide mouth with thin lips and strong white teeth, — compose a visage somewhat of the Tartar cast, not handsome certainly, but not specially forbidding.

Their nourishment is drawn mainly from the sea, with some variety from land-birds, and from penguins and other water-fowls. They spend much of their time in their canoes, which are ingeniously made of birchbark. The smallest are fashioned from a single piece taken entire from the tree, while the largest are composed of five or more pieces skilfully sewn together, and caulked with a species of resin. The large canoes are sometimes fifteen, and even twenty feet long. For transportation the pieces can be taken apart, and at the end of the portage can readily be rejoined and the caulking renewed. They usually carry a small fire at the bottom of the canoe, on a hearth of hardened clay. Their weapons and means of procuring food are the lance and sling, the harpoon, and the bow, the latter unknown to their Patagonian neighbors. The Fuegian bow is by no means the child's plaything which some voyagers have deemed it, who probably never saw it in use. One of the Fuegians in Paris could send an arrow, with simply a sharpened point of wood, through a board one-fourth of an inch thick at the distance of seventeen yards. Another arrow, discharged at the same distance, was buried so deeply in a tree that it could not be withdrawn without breaking. These arrows are usually pointed with flint, or, where it can be obtained, with glass. In the manufacture of these points, they display much skill. The only instrument employed is a long and narrow bone. The workman, holding this bone in his right hand, takes in his left the bit of flint or glass, which he presses firmly on his knee, and rasps violently with his implement, striking off a small fragment at every blow. Thus breaking away, bit by bit, the edges of the object which he holds, he brings it to the desired shape. Twenty minutes ordinarily suffice to complete the arrow-head. In all their other arts, of which they have not a few, the Fuegians show the same quickness and ingenuity. They have no pottery; but they make rush baskets, drinking-vessels of leather or of bark sewn water-tight, and little bags made of bladder, in which they carry their paints and their tinder. There is nothing in all this which seems to indicate in these natives any intellectual inferiority to the other aborigines of this continent.

The author holds that the Fuegians are mainly of the Araucanian race, but the scanty specimen which he gives of the language of those whom he saw seems rather to connect them with the eastern Patagonians. This, however, is a subject for future investigation. What is clear is, that the difference between them and their northern neighbors is due simply to the difference in their position and surroundings. Inhabiting a broken country, — an archipelago composed partly of marshy plains, and partly of rugged mountains; a region deluged by almost incessant rains, and swept by frequent and violent storms, — they have, of necessity, ceased to be hunters, and have become a race of fishermen, deriving a scanty and precarious subsistence from the tempestuous seas which encircle them. Scattered in small bands, composed each of a few families, they have no occasion for chiefs, or for a regular form of government. In this respect they resemble the Eskimo; and, like them, they retain, in spite of this isolation, some of the best qualities of social man. They are pacific in temper, are fond of their children, and hold age in much respect. Like the Eskimo, when brought to a civilized country, they display an intelligence and a good disposition which surprise and gratify their hosts.

Every now and then we receive accounts of savages, who, in intellect and moral qualities, as well as in aspect, are but little above the brutes. Unscientific observers, imbued with the pride of race and the prejudices of civilization, or theorists viewing every thing through the colored medium of an hypothesis, who cast upon these savages a hasty glance, pronounce them to be a sort of connecting-link between man and the lower animals. These unfortunate creatures are found at one time in Australia, at another in the Andaman Islands, and again in South Africa. Sometimes they are Negritos in the East-Indian archipelago, and sometimes Botocudos in Brazil. Then comes the patient missionary, or the discerning and impartial man of science, like the author of this memoir, and enables us to see that these despised beings are simply men of like nature and capacities with ourselves — restricted and hampered, of course, by their environment, but capable, under better auspices, of rising to the same level of enlightenment which has been attained by the more favored races. The important truth embodied in the motto of the Société d'ethnographie (surrounding three figures of different race-types) — '*Corpore diversi, sed mentis lumine fratres*' — is strikingly illustrated by the facts set forth in this valuable essay. H. HALE.

ASTRONOMICAL NOTES.

SINCE the resignation of J.-C. Houzeau as director of the Royal observatory of Brussels, the management of its affairs has been in the hands of a commission consisting of Liagre, Mailly, and Stas. Mr. F. Folie, of the university of Liége, has lately been appointed the director of the observatory.

The journal *Ciel et terre* claims for Royers, a Belgian engineer, the credit of the first suggestion of the device now known as the 'floating dome,' of the form lately built for the observatory at Nice, France. Royer's connection with the subject dates from the year 1880, while letters-patent were issued to a well-known American engineer, covering a device much the same in principle, as long ago as 1863.

The bi-annual meeting of the Astronomische gesellschaft of Leipzig will this year commence on the 19th of August, and continue several days. Several American members of the society will be present at the session, and among them Professor Newcomb, who is now making a tour of the north European observatories. The society meets this year at Geneva.

We learn from *The observatory* that a very laudable effort at teaching the general public astronomy is being made in Christiania. An optician, A. Olsen, has erected a great refracting telescope in the Royal park. For a small fee, any one can observe the celestial bodies with this instrument, and receive instruction and explanations of their nature. The interior of the pavilion in which the telescope is mounted is hung with celestial charts and diagrams, also views of the sun, moon, and planets for facilitating the study of the various objects. This telescope is said to be the fifth in size at present in existence, and its cost was nearly ten thousand dollars.

In *The observatory* for July, Prof. E. C. Pickering of the Harvard-college observatory publishes the results of photometric observations of Ceres ①, Pallas ②, and Vesta ④, with the meridian photometers of the observatory. For Ceres, the mean result for nine observations is 7.71 ± 0.05 magnitude ; and for Pallas, 8.55 ± 0.02. These observations were made in April and May of the present year, while in 1880–82 observations of Vesta were made which gave the result 6.47 ± 0.04 as the magnitude of the planet for mean opposition.

In addition to minor matters, the last annual report of Prof. C. Pritchard, the Savilian professor of astronomy at the Oxford university observatory, states that the memoir on the evidences of mutual gravitation among the components of the group of the Pleiades has been published by the Royal astronomical society; that the photometric survey of the relative lustre of all stars visible to the unaided eye between the north pole and 10° of south declination has been completed with the wedge photometer; and that an examination is now being conducted with reference to ascertaining the relative capacity of two large telescopes — the one a refractor of twelve and a quarter inches aperture, and the other a silver-on-glass reflector of thirteen inches aperture — for the transmission of light.

In the correspondence of a late number of *The observatory*, Mr. W. T. Lynn directs attention to the fact that an erroneous impression has widely prevailed, and is still to be found in many even of the most modern works in astronomy, that Bayer, in affixing Greek letters to the principal stars in the different constellations, arranged them strictly in the order of the alphabet. This error is to be found in Dr. Ball's 'Elements of astronomy,' in the article 'Astronomy,' of the ninth edition of the 'Encyclopaedia Britannica,' and in Chambers's 'Handbook of descriptive astronomy,' and elsewhere. An examination of Bayer's 'Explicatio' sufficiently indicates that such was not the course adopted by him; and this was also pointed out by Argelander in his academic dissertation, 'De fide Uranometriae Bayeri,' published at Bonn in 1832. Bayer divides the stars in each constellation into classes of magnitude, according to the ordinary principal divisions. The stars of the highest order of magnitude in each have assigned them that number of the first letters of the Greek alphabet; those of the next, their number of the next following letters ; and so on. But no attempt was made to arrange the stars in each class according to their respective magnitudes; or rather, as Dr. Gould expresses it, "For the stars of each order, the sequence of the letters in no manner represented that of their brightness, but depended upon the position of the stars in the figure, beginning usually at the head, and following its course until all the stars of that order of magnitude were exhausted."

The Rev. Mr. Saxby of the Royal astronomical society has arranged for a summer's outing in the high Alps, and will use a six-inch equatorial at an elevation of 5,300 feet ; also he has arranged for a series of observations on the Schwarzhorn, at an altitude of 10,400 feet, and is supplied with a spectroscope ranging from A in the red to well below the H lines, and calculated to do good work.

LATE NEWS FROM ALASKA.

MIDSUMMER advices from Alaska report that the military party on the Copper River are advancing toward the Yukon. The navigation of the stream is said to be very difficult. Copper ore had been found, but not conveniently situated, nor in so large quantities as had been supposed. The salmon-canning industry was flourishing, especially at Karluk and Cook's Inlet. The first shipment was made July 1. Robert King, formerly of Unalashka, noted for his kindness to scientific travellers in the territory, and who had made useful contributions to local meteorology and geography, died suddenly, May 29, at Sannakh Island. He was an Englishman by birth, and leaves seven orphan children.

The volcano island of Chernabura, or St. Augustin, in Cook's Inlet, is reported to still pour out smoke and steam from innumerable fissures. A hunting-party stationed there this spring reports

great difficulty in securing water enough to quench their thirst, or fit to drink. Fragments of the rock are reported to be frequently permeated with sulphur, and to present the appearance of a calcined rather than a lava rock.

The hemlock of south-eastern Alaska has been favorably reported on by tanners as unusually rich in tannin. Important beds of white marble have been reported from several points, and will eventually be found, probably, scattered through the coast-region from Port Mulgrave to the eastern boundary. That at Sitka, though never worked, has been frequently visited. That near the surface is inferior, but experts predict an improvement farther in.

The extension of the government over the territory proceeds very slowly. Loud complaints are heard from various quarters, that, as at Kadiak, no official intimation of the organic act promulgated in May, 1884, has yet been received. There is no doubt, that, as in previous dealing with our northern colony, an official lassitude has prevailed, for which various explanations are confidently offered. It is to be hoped that new appointments, when made, will, as in the case of the new executive, be of men qualified by energy and acquirements to advance the interests of the region. It certainly cannot be a benefit to any territory, that officers who are drunkards, ex-convicts, or employés of a private monopoly, should represent the government. Meanwhile the eastern part of Alaska has become the scene of pretty active antagonisms between miners, traders, and missionaries. Theoretically, every man is in favor of missionary work; but when, as in the present case, they take up available land for their schools, teach the Indian to work, and to build civilized houses, to ask a good price for his furs and fish, and on no account to sell his young daughters to white men, as was formerly the practice, — such innovations do not meet with universal favor.

The Patterson is surveying in the eastern district for the coast survey. Commander Coghlan, U.S.N., has furnished a number of useful reconnoissance sketches of harbors, straits, etc., which are being issued by the coast survey, together with sailing-directions.

THREE PHYSICAL TEXT-BOOKS.

EVERY teacher of physics is familiar with the looks of the old-fashioned text-book of natural philosophy. In the early pages come a picture of a wagon on a hillside (a pretty picture, if not for the marring parallelogram hanging from the back), and an air-pump of a pattern only found now as a pair of dingy brass cylinders wabbling on what was a 'highly polished' mahogany base; and, further on, an electrical machine is figured, and such an electrical machine as Franklin might well have called 'a vaste improvement.' The text matches the cuts, — an array of facts and figures derived from experiments long since superseded.

The question has been raised whether the modern knowledge can be made to take the place, in the mental drill of the schools, of the course so long honored. In the old 'Natural philosophy' the facts were so baldly stated, and were served in such a convenient shape for memorizing by the measureful, that it is not strange that one not especially attracted to the study should be able to say, in his after-school years, that he did not remember one word of it all.

There have cropped up, of late years, two kinds of physical text-books in place of the one now fortunately passing off the stage. It is hard to say which is first. There is the book intended as a guide in the laboratory, and of this class is the 'Practical physics' of Stewart and Gee; and there are such books as 'Properties of matter,' and 'Recent advances in physical science,' by Tait, which are meant as true 'text-books' for the capable teacher. It would never do to place either of the last two books in the hands of a machine teacher. A fearful medley of ideas would arise if the pages of 'Properties of matter' were dealt out by the measured stint to be 'learned;' and with 'Recent advances,' it must be feared that the result would be *nil*, so far as the education of the pupil went.

But with a proper guide, one able to introduce a few experiments to illustrate the points in discussion, to refer occasionally to collateral matters, and to hold up one end of a discussion if such should fortunately arise, either of the books by Tait will be found a true natural philosophy. The 'Properties of matter,' treating as it does of hypotheses as to the structure of matter, time, and space, gravitation, elasticity, compressibility of gases, liquids and solids, and of capillarity, and the phenomena of diffusion, will be found full of pithy, suggestive material, — material which will give rise to discussion, and which can be reasoned upon and talked about. The book is one which can be readily used to give the subject of physics a live interest for the instruction in the classroom. It is to be regretted that the author has opened the book with two chapters which are of 'a very miscellaneous character;' and it is not easy to understand why reference to equipotential lines

Lessons in elementary practical physics. By BALFOUR STEWART and W. W. HALDANE GEE. Vol. i. General physical processes. London, *Macmillan*, 1885. 16+271 p., illustr. 12°.

Properties of matter. By P. G. TAIT. Edinburgh, *Black*, 1885. 8+320 p., illustr. 12°.

Lectures on some recent advances in physical science, with a special lecture on force. By P. G. TAIT. London, *Macmillan*, 1885. 3d ed. 20+368 p., illustr. 12°.

should be made, as it is, at the end of the chapter on time and space. But, leaving aside all captious criticism, it is safe to say that 'Properties of matter' is one of the best introductory text-books of physics of which we are as yet possessed.

Whether the lectures on 'Recent advances in physical science' can be used in the class-room, may be questioned. Of the value of the book for collateral reading, there can be no question. This is well enough shown in the fact that we now have the third edition. The desire to deduce much of our knowledge of physical principles from Newton's writings is apparent on many pages of the book, and has given rise to a discussion which is referred to in the preface.

The 'Practical physics,' of which we are promised three volumes, — the first only giving an account of general physical processes, — is intended as a guide for laboratory work. The explanations are clear, and the matter and instruments referred to are such as one actually meets in practice. The book is given up to a description of the ways to measure length and mass; the determination of density; the testing of the laws of elasticity, tenacity, and capillarity; and the measurement of atmospheric pressure, time, and the force of gravity. At the end is given an appendix on the selection, conduct, and discussion of operations suitable for the physical laboratory. The other volumes planned are to be devoted to electricity and magnetism, and heat, light, and sound. It is to be hoped that the succeeding volumes may equal that already published, which is the best book, for its purpose, we know of.

The school world is certainly to be congratulated on the addition to its literature of two such books as 'Properties of matter' and 'Practical physics.'

METHODS OF BACTERIA CULTURE.

THE need of a book in English, giving information as to the best methods of bacteria culture and observation, is a growing one; and, before opening the work under consideration, we were led to hope that it would fill, in a satisfactory manner, the vacancy that now exists.

We are disappointed in it, however, and for these reasons. A large number of methods and materials are described, staining-fluids are given, and authors mentioned; but the whole is thrown together with little or no criticism, and the beginner is as likely to adopt the wrong as the right method of procedure. Particularly is this the case in that portion of the book giving the methods of staining the bacillus of tuberculosis. These methods have been pretty well tested and sifted out; and there is no reason why they should all be given at length, with no more criticism of their value than we find here. As far as investigation yet shows, Koch's or Ehrlich's methods are the ones which are to be absolutely relied upon. Gibbs's double method of staining is absolutely worthless, as the author should know.

The preface to the book states the author's hope that it will be of value to "American investigators, and assist them in adding their share . . . to the mass of facts concerning bacteria;" but surely it would have aided the student still more if he had been informed that all the materials for culture-media and staining-fluids can be obtained in this country as well as abroad.

The form of the book, being of thick paper, and opened with difficulty, is exceedingly inconvenient; and we cannot condemn too strongly the fact that over one-third of the space is taken up by the references, which are printed in the same type as the text.

The technology of bacteria investigation. By CHARLES S. DOLLEY, M.D. Boston, *Cassino*, 1885. 12+263 p. 12°.

THE PERMIAN REPTILES OF BOHEMIA.

OF this excellent work, we have now before us the first volume, and the first part of the second one, containing the Stegocephali Cope (Labyrinthodontia autorum); in all, two hundred and fourteen quarto pages text, and sixty plates, some of them folding. The present work is not only the best ever given on the subject, but one of the most valuable publications which has ever appeared in paleontology. The Lyell prize, awarded to the author by the Geological society of London, is one testimony to its excellence. The plates are among the best we have ever seen, and were all drawn by the author himself.

After an introduction showing the geological position of the fossils, a preliminary review of the fossils found is given, which consist of the following species: Stegocephali, 43; Dipnoi, 2; Pisces, 31; Insecta, 1; Arachnoidea, ?; Myriapoda, 3; Crustacea, 5; Mollusca, 1.

This is followed by a detailed history of the

Fauna der gaskohle und der kalksteine der permformation Böhmens. Von DR. ANT. FRITSCH. Band i., ii., 1. Prag, 1879–85. 4°.

different systems proposed for the labyrinthodonts, forming a very convenient compilation for the student. The rest of the book is devoted to descriptions of the different families of the Stegocephali. The author concludes that the paleontological material is still too meagre to venture on a genealogical table, but promises to offer a comparative discussion at the end of the whole work.

The first part of the second volume contains the Dendrerpetondidae, Diplovertebridae, Archaegosauridae, Chauliodontia (Miall), and Melosauridae. In the beginning we find the remarkable note, that it is difficult to accept Cope's division into Rachitomi and Embolomeri, based on the characters of the vertebrae, because both kinds of vertebrae (rachitomous and embolomerous) can be found in the same animal. The embolomerous form seems to be developed in the caudal, the rachitomous form in the thoracic, region.

The question whether the hypocentrum or the pleurocentra constitutes the base of the vertebra is decided by Fritsch in the following way: A normal vertebra with *one* centrum never can be formed from a rachitomous vertebra, but only an embolomerous vertebra with two disks. The rachitomous form prepares the embolomerous, and it is not surprising that both forms exist in the same animal.

The following parts will contain the fishes and arthropods, and in the final part the general conclusions will be given.

Finally, it should be mentioned that galvanoplastic copies of thirty-five Stegocephali have been prepared by the author, which cannot be distinguished from the originals. They are obtainable at the low price of fifty dollars from the author, 35 Brenntegasse, Prague.

PRACTICAL BOTANY.

TEACHERS who carry their classes beyond the elements of analytical botany find the number of adjuncts at their disposal increasing rapidly, so far, at least, as histology is concerned. Beside general text-books of all grades, and the treatises, large and small, on the methods of microscopical work, explicit directions for the study of common representative plants are now published in several languages.

So far as a short course is concerned, the demand for laboratory directions is already well met by the botanical portion of Huxley and Martin's 'Biology,' which any capable teacher can bring to date by a few lectures, and supplement by synopses of work for a few additional plants, like Spirogyra, Aspergillus, and Penicillium; and it is doubtful if many courses offered in America are comprehensive enough to warrant carrying this part of the work further. Yet to students who have time for additional work in this direction, without the knowledge requisite for carrying it on independently, this little book of Mr. Bower's, which owes its origin to the same causes that produced Huxley and Martin, will prove exceedingly useful. If it cannot be said to equal Strasburger's 'Botanisches practicum,' it has the merit of being in English, and bears evidence of careful workmanship on every page, while it is sensibly bound for laboratory use.

A course of practical instruction in botany. By F. O. BOWER, M.A., F.L.S., and SYDNEY H. VINES, M.A., D.Sc., F.L.S. Part i. Phanerogamae-Pteridophyta. London, *Macmillan & Co.*, 1885. 11+226 p. 16°.

NOTES AND NEWS.

THE vessel Alert, sent to visit the stations established last summer in and *en route* to Hudson Bay, has been obliged to return by reason of the prevalence of pack-ice, the exhaustion of their coal, and certain damages sustained. She will start again; but those interested in the commercial route *via* Hudson Bay to Manitoba are much disappointed; and the return is generally regarded as evidence that such a route would be even more precarious and uncertain than its opponents have claimed.

— Dr. Elkin, in charge of the heliometer of the Yale-college observatory, has been engaged for nearly a year and a half past in measuring the group of the Pleiades, his original plan being to measure with this instrument the same stars which Bessel measured with the Königsberg heliometer about fifty years ago. Dr. Elkin has taken advantage of all the improvements in the instrument and the methods of using it which have been developed in the last half-century; and, in addition to the successful carrying-out of his carefully elaborated plan of triangulation, he has also been able to extend his work to a large number of stars which Bessel did not measure. The position-angle and distance of the Bessel stars from the large star Alcyone are included in the work. The results of this very valuable work cannot be fully discussed, and prepared for publication, until the positions of certain stars of reference have been obtained from the work of other observatories where they are now being determined. Dr. Elkin has also obtained measures of the distances of a number of craters on the moon from neighboring stars, on thirty-six nights, near the times of first and last quarter. The positions of these craters on the moon itself have been determined; also series of measures made of the diameters of Venus, of the outer ring of Saturn, and of the satellite Titan

referred to its primary. A registering micrometer has been devised, and, in the form constructed by the Repsolds, has proved a complete success, greatly increasing the amount of work which the observer can accomplish. Dr. Elkin proposes to devote the heliometer for a year and a half to come to investigations in stellar parallax. The plan of research mapped out and already commenced will, it is hoped, if carried to completion, furnish a reliable value of the relative parallax of stars of the first and eighth magnitude.

— The fourteenth meeting of the French association will take place, says *Nature*, on Aug. 12, at Grenoble. Verneuil, member of the Academy of medicine, will be president. The public lectures will be, 'On the new gallery of paleontology of the Paris museum,' by Cotteau, ex-chairman of the Geological society of France; and by Rochard, general inspector of the marine, on 'The victualling of France.' A large number of medical questions will be dealt with in the several sections of the congress. The Ferran cholera experiments are sure to be discussed at full length. Numerous excursions will take place in the Alps, under competent guidance, as far as Chambery.

— An abstract of the second report of Albert Williams, jun., on the mineral resources of the United States for the years 1883 and 1884, has been issued in advance of the report itself. From the abstract we condense the following table, giving the value of the

Substance.	Value.			
	1880.	1882.	1883.	1884.
Coal . . .	$94,567,608	$146,632,581	$159,494,855	$143,768,578
Pig-iron . .	89,315,569	106,336,429	91,910,200	73,761,624
Silver . . .	41,110,957	46,800,000	46,200,000	48,800,000
Gold . . .	33,379,663	32,500,000	30,000,000	30,800,000
Petroleum .	24,600,638	23,704,698	25,740,252	20,476,294
Building-stone . .	18,356,055	21,000,000	20,000,000	19,000,000
Lime . . .	–	21,700,000	19,200,000	18,500,000
Copper . .	8,886,295	16,038,091	18,064,807	17,789,687
Lead . . .	2,102,948	12,624,550	12,322,719	10,537,042
Salt. . . .	4,829,566	4,340,140	4,211,042	4,197,734
Cement . .	–	3,672,750	4,293,500	3,720,000
Zinc . . .	2,079,737	3,646,620	3,311,106	3,422,707
Mineral waters . . .	–	–	1,139,483	1,665,490
Natural gas .	–	215,000	475,000	1,460,000
Minor mineral products . . .	3,387,444	15,995,830	15,841,664	15,205,464
	$322,616,480	$455,216,689	$452,204,628	$413,104,620

mineral products of the United States for 1882, 1883, and 1884 respectively; and to these we have prefixed the values obtained by the U. S. census for 1880, so far as known. No condensed table of quantities could be made, owing to the variability of the units of weight and measure employed. The great difference observable between the estimates for 1880 and those of later years is probably due rather to the methods employed for obtaining the mineral statistics, than to any such rapid increase in the value of the products as the figures would indicate. The amount of copper produced has steadily increased from 91,646,232 pounds in 1882, to 117,151,795 pounds in 1883, and 145,221,934 pounds in 1884; but the value of the product is less in the last year than in 1883. The value of the mineral waters produced in 1884 is over one and a half millions of dollars, nearly 69 million gallons being sold; while the amount of natural gas produced has been subject to a rapid increase, particularly during the years of the tariff agitation. The quantity of quicksilver produced has steadily diminished, while that of coal has increased. In the list of minor mineral products we have for 1884 such items as 2,000 tons of slate ground as a pigment, 35,000 tons of iron pyrites, 10,900 tons of felspar, 281,100 pounds of bromine, 10,000 tons of manganese ore, 147,410 pounds of mica, 431,779 tons of South-Carolina phosphate rock, 3,401,930 tons of limestone used as an iron flux, 875,000 tons of New-Jersey marls, 25,000 tons of heavy spar (barytes), 7,000,000 pounds of borax, and 1,800 troy ounces of aluminum. The general diminution in the total value of the mineral products of $3,012,061 from 1882 to 1883, and of $39,100,008 from 1883 to 1884, is due, as a whole, more to a decrease in price than to a decrease in the quantity produced.

— The Botanical club of the American association will hold its meetings during the week of the association, the hours and place to be announced on the daily programme, and not on Tuesday the 25th, as erroneously stated in the circular of the permanent secretary, and elsewhere. The first meeting will probably be on Thursday morning, Aug. 27, at nine o'clock. The club invites short and informal communications on any botanical subject of interest. This will obviate the necessity of presenting any but the most important and well-digested botanical papers before the biological section. Any person interested in botany who is also a member of the association may become a member of the club simply by registering.

— The chemical wonder of the London inventions exhibition is said to be the manufacture of oxygen by the process of Brin frères. They have made what is really an artificial mineral lung of anhydrous oxide of barium; and with this, by an ingenious process, they simply take up the oxygen from the atmospheric air. First, the air is drawn, by means of a partial vacuum, through a vessel of quicklime, which absorbs all the carbonic acid and moisture, and reduces it to a mixture of oxygen and nitrogen. These gases are then drawn into the retorts, heated at 500°, and the artificial lung absorbs the oxygen, while the nitrogen is drawn off to a gasometer for conversion into ammonia, etc. The Brins have, for the first time, made the artificial lung indestructible. The use of baryta for the purpose is not unknown; but hitherto the baryta has been perishable, and has required renewal every four and twenty hours, at great expense. They make it virtually indestructible and unchangeable. In this way they claim to have effected an absolute revolution in chemistry: for with a lung for the machine, and the atmospheric air for the material, they can make just as much oxygen as they like; and its uses, present and prospective, are almost innu-

merable and incalculable. For ventilation, aerating water without carbonic acid, for increasing the heat of blast-furnaces and the light of lamps, its uses are self-evident. The nitrogen, which was at first looked upon as wasted, has, by a process due to the same inventors, been turned into ammoniacal salts for manure. Most of the uses of these products were known. What is claimed is the almost fabulous reduction in the cost of production. The chemical text-books, according to Messrs. Brin, are at fault as to the possibilities of baryta. They all teach that it is destructible; and the Brins maintain, that, as they know how to treat it, it is indestructible. Oxygen in large quantities means a revolution in half the processes of chemical industries.

— Before the Amherst-college science association (see *Science*, v. iii. p. 340), the following addresses have been given, and papers read, during the past year: German university life, by G. G. Pond, M.A.; Origin of the vertebrate type, by Prof. J. M. Tyler; The chemistry of photography, by H. B. Ames; Artificial diamonds, by E. H. Smith; Chemistry and its relations, by Prof. E. P. Harris; Post-routes during the siege of Paris, by W. I. Fletcher, M.A.; Atomic weights, by W. H. Hallock; Relation of literature to science, by President J. H. Seelye; Torpedoes, by J. W. Morris; Relation of the mind to the body, by I. H. Upton; Storms, by A. F. Stone; Geology of regions about the Rhine, by Prof. B. K. Emerson; Marriage, by Dr. E. Hitchcock; Labrador, by W. A. Stearns; Astronomical photography, by Prof. David P. Todd; Nebular hypothesis, by Prof. B. K. Emerson; Migration of birds, by F. T. Jencks; Relations of animal to human psychology, by Prof. J. M. Tyler; Geology of South Africa, by B. N. Bridgman; How to choose a physician, by Dr. H. H. Seelye.

— The geological survey of Pennsylvania has now collected the various maps of the Panther-Creek and other coal-basins of that state, to form part i. of its 'grand atlas' of the anthracite coal-fields. It contains twenty-six sheets relating to the eastern end of the western, middle, and southern fields in four counties of the eastern part of the state. They have been published before by instalments, and noticed by us at different times; but their collection into a single atlas marks a welcome stage of that part of the work, under the superintendence of Mr. Ashburner.

— Rear-admiral English, who was recently in the Kongo country, has made a report to the Navy department in regard to the advisability of establishing a commercial station at the mouth of the Kongo River, or of securing a limited district for a depot and 'factorial establishment' for American citizens in that region. He says that the investigations made by Commander Bridgman and U. S. commercial agent Tisdell show that all the available land has been acquired for the nation by the trading-house employees, and is held at extravagant prices. Under these circumstances, Admiral English deemed it unnecessary to take any further action, and was of opinion that to establish a proposed coaling-depot at the Kongo would be unwise and unnecessary. Admiral English quotes from a letter from Tisdell, in which he says, "The reputed wealth of the Kongo valley has been greatly exaggerated, and it will be an undesirable and unprofitable country for an American to make his home or to embark in any business enterprise. Between Vivi and Stanley Pool I saw on all sides misery, want, sickness, and death, particularly among the employees of the International association. The country does not and can not produce food for the white man to live upon, and barely produces enough for the natives." This opinion is confirmed by Commander Bridgman of the Kearsarge, who says that it would be unwise for the government to do any thing to encourage Americans to go to that region. Commander Bridgman has no faith in the future of the Kongo predicted for it by interested parties.

— At the meeting of the Gas institute held in Manchester, Eng., in June, Mr. William Gadd read a paper on the effects of heating air upon combustion. For a considerable period, on purely theoretical grounds, Mr. Gadd had strongly doubted the value of heated air at ordinary pressure as a means of intensifying or causing more perfect combustion. Recent investigations strengthened his doubts to an enormous extent. An observation made by Professor Dixon, in connection with some experiments on a certain regenerator-burner, in which he found that a small quantity of air let in at the bottom or lower part of the lamp much increased the intensity, produced a strong impression on his mind, and confirmed the views he had formed. He therefore resolved to devise some simple experiment which would determine the point. He employed many methods which showed, all of them, in some degree the expected result, and strengthened the belief in the discovery which theory pointed out. He was at last enabled to formulate a method to make the conclusions unmistakable and plain. He found a peculiar phenomenon of flame, which he termed 'a balanced flame of imperfect combustion.' In this he recognized the means for what he conceived to be complete demonstration of that which he had long suspected; namely, that, so far from the heating of air in passages at constant or ordinary pressure increasing combustion, it actually retarded or rendered combustion more imperfect. Mr. Gadd described his experiment, and produced before the meeting the 'balanced flame' he spoke of. His conclusions were strongly contested by several speakers.

— The slight epidemic of small-pox in Berne last winter has hastened the passing of the new vaccination act there, which differs slightly from the previous one. Vaccination is not to be invariably compulsory, a physician's recommendation being sufficient if dispensed with. As a rule, animal lymph, not human, must be used, and the consent of the parents is requisite. The state will provide the doctors with lymph, the doctors undertaking to vaccinate gratis. Any doctor can be prosecuted for injury caused by careless vaccination.